THE POOL SYSTEM

The swimming pool system filters and helps maintain the clarity of the pool water. As the water is circulated by a properly designed system the water evenly distributes the chemicals that are added to the pool to control purity and chemical balance.

The filtration system re-circulates and filters the water in the pool. It enables the initial water supply to be used over and over again, adding just the little water necessary to backwash the filter and compensate for evaporation and splash-out.

The filtration system is composed of four elements: the filter, a pump and motor, an automatic surface skimmer, and recirculating piping.

The **PUMP** circulates the pool water through the filtration system; mixing and sanitizing chemicals.

The water passes through the **FILTER** which removes unwanted debris. The filter used for your pool is a High-rate sand filter. This filter is a pressure vessel moulded from a chemical resistant thermoplastic. It has a system of drains and water distribution that maintains a non-turbulent flow through the filtering media. The media consists of a special grade of sand which if properly maintained will last for several years.

To clean the filter sand the filter must be backwashed ie, the flow through the filter must be reversed. For your filter this is done conveniently with the aid of the multiport valve mounted on the top of the filter. About 80 gallons to 400 gallons of water is used during the backwash.

The **PLUMBING SYSTEM** is designed to circulate all the water through the filtration system. Normally, water is drawn from the pool through the main drain and the surface skimmer; passes through the suction lines to the pump and filter and then returns to the pool via return lines and return inlet fittings.

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TREATING YOUR POOL WATER

Filtration, chemical treatment, and cleaning are the three essential methods of keeping the pool water clear, clean and free of bacteria. Beginning from the time the pool is filled, the job of maintaining safe pool water continues the year around for the life of the pool.

You can hire a pool service company like AL MESK POOLS to do the job, or do the work yourself.

The Role of Filtration:

The filtration system is the primary method for removing solid material that clouds the water; it also disperses the pool chemicals throughout the water so they can do their job.

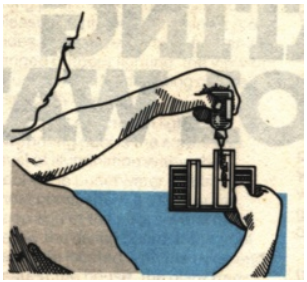
A properly designed system should pass all the water in the pool through the filter within a given period of time usually 6 to 8 hours. This is called turnover rate. Without proper circulation the pool will have dead areas where the water stagnates and is never or seldom filtered, even though the filter may be working perfectly.

Whenever poor water clarity or chemical imbalance become apparent, increase the filtration time until the condition is corrected. After filling the pool for the first time, you'll need to run the filter continuously until the water is clear. In properly filtered and chemically treated water, you can clearly see the main drain in the pool. A timer fitted to the pump circuit allows the pump to turn on and off automatically.

Pool Water Chemistry

Treating your pool water with chemicals maintains the chemical balance, disinfects the water, and keeps it sparkling clear. The water must be tested regularly for various characteristics and the correct amounts of certain chemicals must be added if required.

How to test your pool water:



Proper water testing is your major guarantee against the development of serious problems. The **TEST KIT** supplied to you will provide the information necessary to determine the chemical requirements.

The test kit enables you to test for **pH** and **disinfectant (Chlorine) residual**. Testing is a simple process. You fill the small tube with pool water, add a reagent in the form of a tablet or test solution and check the reading. The treated water is then compared to a color standard. The best time to test the water is in the early evening. Avoid surface water when you fill the tube. Take a sample from a depth of at least 12 inches. Look at the color against a light background and read the test within 4 to 5 seconds after adding the reagent. Always rinse the tube before and after use. Follow the instructions for testing carefully.

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POOL FILTRATION

- Swimming pools and spas are subject to constant contamination from foreign matter brought in by swimmers, wind and articles used in and about the water. Such contamination includes particles of dirt, organic matter, bacteria, algae, hair, makeup, suntan and body oils, leaves, mineral residue from chemicals and debris.
- Filtration is the mechanical process of removing this insoluble matter from swimming pool and spa water. Pool water carrying particulate matter, solids and debris is passed through filtering media that allow the water to return to the pool clear. Water clarity is important for appearance, hygiene and safety.
- The US National Sanitation Foundation recommends that pool water turbidity (1/clarity) shall not exceed 0.5 NTU (Nephelometer Turbidity Units). However for short times during peak bather loading, this shall not exceed 1.0 NTU, and the pool filtration system shall be capable of returning this water to 0.5 NTU within 8 hours following this peak use.
- A common method of noting water clarity is to be able to see the pool drain clearly from the pool deck or to see clearly a 2" disc with black and red quadrants through 15 feet (4.6m) or water.
- The factors that determine water clarity are flow rate, amount of filtering area and effectiveness of filter media.
- Once equilibrium is achieved, a six-hour turnover will result in 99% clarification assuming that the filter medium is effective and the filter is properly sized to accommodate the amount of contamination introduced into the water.
- The quality of pool water should be equal to or better than the quality of drinking water.

Number of times Pool Volume is filtered each 24 hrs (turnovers per day)	Hours required to Filter Pool Volume (turnover period)	Percent Clarification of Pool water after equilibrium is obtained	Number of days required to attain equilibrium
1	24	42	9
2	12	84	4
3	8	95	3
4	6	98	2
5	4.8	99	1

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Water balance

Controlling the chemical balance of pool water is vital. The ideal range is slightly on the alkaline side, between **7.4 and 7.6 on the pH** scale. If the pH is too high (alkaline), disinfectants are less effective in destroying bacteria and algae; water will be cloudy, scale can develop and the filter can be blocked. If the pH is too low (acidic), it will cause eye and skin irritation, corrosion of metal parts, and etching and discoloration. Because over acidity can be the most serious, do not allow the pH to get below 7.2.

Testing pH is simple. The water sample in the test kit will change color according to the pH. During the summer, the pH should be tested three times a week. Always test for pH after a storm or at other times when large quantities of contaminants have been carried into the water.

Contact your pool company for chemicals to raise or lower the pH of the pool water.

Disinfecting the pool water

Bacteria are the main cause of unsanitary pool water. These microscopic organisms, some of them harmful, invade pool water by means of carriers – mostly people. Particularly in pools with heavy use, bacteria control cannot be overemphasized.

Chlorine is by far the most popular disinfecting agent. It has proven to be effective and easy to use.

Add chlorine only in the evening or early morning hours. Keep the filtration system on to distribute the chlorine in the pool.

Whenever you add chlorine, it immediately goes to work killing algae and bacteria, but in the process these same algae and bacteria destroy some of it. The amount of chlorine used up in this manner is the chlorine demand of the water. ***The amount of disinfectant left in the water is referred to as the chlorine residual.*** This **free residual** keeps the pool sanitary, and only a small amount of it is required.

Pool water also contains ammonia and other compounds of nitrogen, particularly ammonia nitrogen. Chlorine and ammonia combine to form chloramines which cause the unpleasant odor often associated with chlorine, particularly pungent if the pH is low. ***If you can smell the chlorine, there isn't enough residual chlorine in the water***, as chlorine in an uncombined state is practically odorless.

The chlorine residual, that which is not combined with nitrogen, should never drop below 0.5 ppm it must be ideally **between 0.5ppm and 1.5 ppm**. Chlorine residual is tested in the same way as the pH. Follow the instructions on your test kit.

Sunlight, water temperature, heavy pool use, and wind can all deplete the chlorine residual. Regular use of chlorinated iso-cyanurate should keep the residual at a safe level. But a day of

heavy use can destroy all the chlorine in the water unless you take preventive measures by adding an extra dose before swimmers arrive. Even then, the supply may have to be replenished at the end of the day to restore the residual level.

Superchlorination

Superchlorination involves adding **5 to 7 times** the normal dose of chlorine to pool water to burn out nitrogen compounds and human wastes.

Superchlorination must be done when the combined chlorine reading is higher than .2ppm, or about every 2 weeks during the swimming season. Superchlorination should be done only after sundown, since the UV sun rays are likely to destroy some of the chemical. Close the pool to swimmers until the residual level drops to normal: 1.0 to 3.0 ppm.

Chlorinated isocyanurates are the chlorine compounds with cyanuric acid base. These are the most popular and easy to use forms of chlorines. These chlorine compounds are easy to use, dissolve readily, leave no calcium residue to damage filter media, and do not appreciably alter the pH. They're available in tablets, sticks, or granulated form.

Continued use of chlorinated isocyanurates may cause the cyanuric level in the water to increase over a period if water is not discarded by backwash or splashout. If the cyanuric acid in the water tests out at over 100ppm, the pool may have to be partially drained and refilled with fresh water. Your pool service company can test the cyanuric acid level in the pool.

The granulated type of fast dissolving chlorine may be added directly to the pool and is particularly good for spot treatments of clinging algae.

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SPECIAL WATER PROBLEMS

Algae

Good water maintenance normally will keep algae under control. If the water takes on a greenish or mustard colored cast and black or dar green spots appear on the surface finish, you have algae.

There are two types of algae: free floating and clinging. Some of the clinging varieties may resist all efforts and hang on as black, green or brown patches.

There are several ways to get rid of algae.

Check the total alkalinity of the pool. Have it adjusted 80-120 ppm. Adjust the pH to 7.2 to 7.4. Then **superchlorinate**. Shut down the filter for about 24 hours. Brush the walls briskly, restart the filter and vacuum away the dead algae. To get rid of black spots, brush the pool and turn the pump off. When the water becomes still, carefully pour trichlorinated isocyanurate into the pool so it covers the area. Brush again the next day. Then turn on the pump to filter out the debris. Do not allow swimmers in the pool during this period.

Pouring liquid chlorine right on top of them can destroy persistent colonies clinging to interior surfaces. However, only the outer layers of cells may be killed, leaving surviving cells beneath to re-emerge when growth conditions are favourable.

Ask your pool service company for recommended Algaecides.

If algae persist, call the pool service company.

Check chlorine residual and pH after heavy chemical treatments, and do not allow swimmers in the pool until the water is properly balanced and the chlorine is at a safe level.

Stains

A pool surface can be stained by debris, metal objects, algae and mineral deposits. Yellow or reddish brown stains may be caused by iron in the fill water. Too much acid added to the water at one time can cause stains. Maintain the proper pH to help prevent staining. Hairpins, toys or other metal objects dropped into the pool should be removed immediately to prevent rust stains.

Corrosion and electrolysis.

Corrosion can result from an over acidic condition, improper use of acid chemicals, or oxidation. Corrosion also can be caused by electrolysis. Whenever two different metals come in contact with chemically treated water, a small electrical current flows between the metals. This current does not give an electric shock, but it can cause corrosion of active metals such as iron and produce rust spots on metal.

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MAINTAINING YOUR POOL

Maintenance of your swimming pool begins as soon as you fill it with water and continues the year around. Summer and winter, your pool needs some attention to keep the equipment functioning smoothly, the water clean, and the pool shell in good condition.

Pool maintenance requires a regular schedule of routine work intended to make your pool pleasant to swim in and to ward off serious problems.

You can contact a pool company like **AL MESK POOLS** to maintain and chemically treat your pool. The monthly charge depends upon the number of service calls and the pool size.

Maintenance Equipment

Very few pieces of equipment are required to maintain a pool:

A Vacuum cleaner or vacuum head, a leaf skimmer or net, and brushes.

The **vacuum cleaner** works from the **vacuum point** that's part of the filtration system or through the skimmer. The cleaner consists of a suction head, wheels for mobility, a nylon brush for removing dirt, a floating hose from the suction head to the vacuum fitting and a handle. The cleaner is hooked up to the vacuum fitting and is pushed slowly around the bottom of the pool. Water, dirt and debris are pulled into the filtration system. Leaves and other large objects, such as pieces of paper, are caught in the strainer basket; smaller particles are removed in the filter. The clear water is then returned to the pool through the inlets.

The leaf **skimmer** is an aluminum or plastic frame with a plastic mesh skimming net.

Brushes with nylon bristles are usually recommended for long life. You may also need a stainless steel brush for removing algae, rust stains and entrenched dirt.

Aluminum handles that fit the vacuum cleaner, leaf skimmer, and brushes are available. One handle is enough since it can be used interchangeably with all the cleaning tools. The telescopic handle supplied is helpful.

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Regular cleaning procedure:

There is no set pattern for pool cleaning. You can work out a procedure that best suits your particular situation. The following maintenance procedure serves as a good starting point:

1. Use the leaf skimmer to **collect debris floating on the surface** of the pool or lying on the bottom. It's much easier to skim the surface than dredge the bottom, so use the leaf skimmer often to remove debris before it can sink.

2. **Clean the border and walls**. The scum line that forms at the water line is a combination of oil and dust and can be cleaned off with household powders and a sponge. Never use steel wool to clean tile. If heavy scale persists, call a pool professional. Brushing the pool walls requires even coverage rather than strength. Brush the walls all the way down to the floor, so the dirt can be picked up with the vacuum cleaner. Whenever possible brush toward the main drain so some of the dirt will be pulled into the filter system as you work. Start at the shallow end and work toward the deep water. Overlap your strokes so the entire surface receives a good scrubbing.

3. **Clean the strainer baskets** in the skimmer and pump. Make sure all the debris is removed so that there is maximum suction.

4. VACUUM THE POOL at least twice a week and more often if there is an extra heavy dose of debris.
   The vacuum hose must be completely filled with water before it is attached to the vacuum point on the filter line.

   - Slowly submerge the hose in the water to eliminate air bubbles. Holding one end against a return line with the hose in the water will also work. Don't lift the vacuum head out of the water while it is in operation.
   - While operating the vacuum close the valves on the main drain and the skimmer line and open the valve on the vacuum line. The water level in the pool should be above the vacuum inlet so no air can reach the fitting and enter the lines.
   - Work the vacuum slowly back and forth and overlap each stroke to avoid missing any spots.
   - Try not to run fresh water into the pool while vacuuming.
   - It is sometimes advisable to vacuum directly to waste, if there are heavy precipitates or an unusually high soil load to be removed. This cuts down maintenance of the filter media.

5. **Backwash and service the filter**. The equipment will last longer when backwashed regularly and thoroughly.

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BACKWASHING THE FILTER can be done by turning the multi-position valve to the backwash position. This reverses the flow of water through the filter, raises the sand bed, and cleans it. The reversed flow carries the dirt and debris out through the waste line.

Always turn the pump off before turning the multi-position valve.

- With the valve in the **backwash** position, open the valve on the waste line and turn on the pump. Allow it to run for 2 to 4 minutes until the waste-water is clear. (You can watch the water through a sight glass in the filter housing.)
- Shut off the pump and turn the valve to the **rinse** position, allowing the water to flow through the filter bed in the normal direction and into the waste line.
- Turn the pump back on and run for about 15 to 20 seconds. This resets the sand bed and prevents any dirt from reentering the pool when you start filtering again.
- Shut the pump off and turn the valve to **filter** position, the normal position for routing the water through the filter and back to the pool. Turn the pump back on. Close the valve on the waste line.
- The valve has other positions as well: The **recirculate** position by-passes the filter and can be used until the filter is serviced. The **waste** position discharges water from the pool directly into the waste line. Use this position to lower the water level or to get rid of a lot of dirt when vacuuming. (Remember to open the valve on the waste line). The **closed** position is used when the system is not running. Never run the pump with the valve in the closed position.

6. **Test the water**.
7. **Add Chemicals**
8. **Hose the coping and deck**. Keep the spray directed away from the pool to prevent silt from being washed into the clean water.

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Recommended Procedure for Backwashing the Filter

- Note the positions on the multi-port valve
- Main drain valve open
- Skimmer/Balance tank valve closed
- Vacuum valve closed
- Switch off pump
- Open waste line valve
- Turn multi-port valve to **BACKWASH**
- Switch on pump
- Watch dirt in sight glass
- Turn off pump after 3 mins
- Turn multi-port valve to **RINSE**
- Switch on pump for 1 min
- Switch off pump
- Turn multi-port valve to **FILTER**
- Close the waste line valve
- Switch on pump
- Open skimmer/Balance tank valve as required.

- **ALWAYS SWITCH OFF THE PUMP BEFORE OPERATING THE MULTI-PORT VALVE**

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Basic Water Testing

- Check the test kit
- Rinse the container with pool water
- Dip the container into the pool water and fill with pool water from at least 40 cm below
- Check the water level in the container
- Add 5 drops of yellow cap (chlorine test) reagent to water in the chlorine side.
- Add 5 drops of red cap (pH) reagent to water in the pH side.
- Fix both the caps on the container.
- Shake the container to mix the reagent and water.
- Check the colour against a white back ground.
- Note the readings.
- Empty the container back into the pool.
- Rinse the container.

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SUPPORT SYSTEM MAINTENANCE

Maintaining the support system: filter, pump and other parts, involves keeping everything in working order and watching for and correcting small problems before they develop into expensive repairs.

Filter:

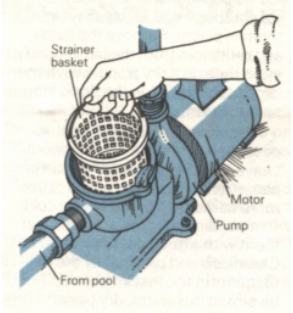
The obvious time to clean the filter is when the water is no longer clear. The best time, though, is before the quality of the water deteriorates. To determine when this is, look for an increase in pressure registered by the **pressure gauge** on the filter tank. Record the pressure reading when you start up a clean filter with clean strainer baskets in the pump and skimmer. Depending on the filter and the rest of the system this pressure ranges from 6 psi to 20psi. When the pressure has **increased by 8 to 10 psi**, it's time to clean the filter. Regardless of pressure readings, the filter must be cleaned at least once a week.

If the pool is properly treated, the filter will require no extra maintenance. But chemical imbalance in the water can harm the filter. Water high in pH and calcium precipitation can turn the sand bed into a solid chunk of scale. If you're having to backwash your filter often and noticing inadequate filtering, scale, and dirt in the pool, open the filter and check the condition of the bed. If you find dirt deep in the sand, it's time to replace the sand. How often you need to change the sand depends on the amount of dirt entering the pool; generally, it needs to be done only **once a year**.

Pump & Motor:

The type most often used for pools has self-lubricating bearings and seals that don't need lubricating. Usually you'll need to remove hair, leaves, and other debris from the strainer basket when you vacuum the pool or when you've shut off the pump to clean the filter.

To remove the basket, shut off the pump; turn off the valves on the pipes from the skimmer, main drain and inlet. Then remove the cover, lift out the basket and clean it. After the clean basket is in place, replace the cover and tighten it securely. Open the valves on the skimmer and main drain pipes and turn the pump on.



Though the pump is self-priming, it may lose prime when the basket is cleaned or when there's an air leak under the basket cover or elsewhere in the system. To prime the pump, remove the basket cover, fill the pump to brim with water and quickly replace the cover and start the pump.

If the pump doesn't work call the pool service company.

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TROUBLE SHOOTING TIPS

1. **Cloudy, milky, or turbid water**
   - Operate the filter for a longer time
   - Backwash the filter
   - Check and adjust chlorine and pH
   - Check for air leak in the intake lines to pump
   - Make sure the filter multi-position valve is in filter position.
   - Check skimmer and pump strainer baskets for debris
   - Add water clarifying agent.

2. **Green or brown cloudy water**
   - Algae

3. **Cloudy or hazy water with rapid rise of pH**
   - Early algae growth

4. **Brown or green slime on pool surfaces**
   - Algae

5. **Black spots on pool surfaces**
   - Black algae

6. **Reddish brown, brownish black, blue or blue green water.**
   - Metal (iron, copper or manganese) in water. Call pool service company

7. **Clear green water turning to reddish brown**
   - Indicates iron

8. **Eye and skin irritation**
   - Test and adjust pH

9. **Eye and skin irritation, strong chlorine smell**
   - Test and adjust pH; superchlorinate

10. **Low water flow**
    - Backwash sand filter.
    - Check for air leaks in intake lines
    - Check for restrictions in intake and return lines
    - Check pump and skimmer strainer baskets for debris
    - Be sure proper valves are open

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11. **Filter needs frequent backwashing**
    - Check for algae, if present treat accordingly.
    - Check and adjust chlorine and pH levels
    - Clean sand filter with special cleaner (See pool service company)
    - Check surface of sand in sand filter; if cracked or crusted, remove 1" sand.

12. **Pump motor doesn't start**
    - Blown fuse or tripped circuit breaker
    - Loose electrical connection or broken wire

13. **Pump motor noisy**
    - Loose connections between pump and motor
    - Worn bearing in motor

14. **Pump runs but doesn't pump**
    - Low level in pool; add water
    - Clogged filter- backwash
    - Air leaks in intake lines
    - Loose pump impeller
    - Pump has lost its prime

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